

15 and 16. Tests of Significance

"T" Test for the comparison of two averages. "F" Test for the comparison of two variances or standard deviations. "Chi" square test, frequency data and contingency tables.

17 to 20. Analysis of Variance

Single factor and two factor situation, analysis of components of Variance.

21. Optional Examination

Text for the Course:

A.S.T.M. Manual on Quality Control of Materials and Introduction to Statistical Methods by H. J. Halstead. These texts will be made available through the University Book Store. Military Standard Procedures for Inspection by Attributes and Variables; MIL-STD-105D and MIL-STD-414 will be supplied to the students.

LECTURERS: Mr. R. V. Ward, B.Sc.

Senior Member A.S.Q.C.,  
Production Superintendent,  
Canadian Industries Limited.

Mr. S. M. Prout, P.Eng.,  
Fellow A.S.Q.C.,  
Design Engineer,  
Canadian Controllers Limited.



UNIVERSITY OF TORONTO  
UNIVERSITY EXTENSION

Session 1964-65

Course in

QUALITY CONTROL  
THROUGH  
STATISTICAL METHODS

in co-operation with the  
TORONTO SECTION  
AMERICAN SOCIETY FOR QUALITY CONTROL

## QUALITY CONTROL THROUGH STATISTICAL METHODS

**Tuesdays**

**20 Lectures**

There are two major requirements for control of quality in a manufacturing operation: first, scientific control of the operations and processes, and second, control of the methods of collecting and analysing information about the processes. This is accomplished by applying special techniques based upon known and tried statistical theories. This course, which reviews briefly the content of the introductory course, is mainly concerned with demonstrating what these techniques are, how they can be applied, where they are suitable and how they operate. Also, the analysis of the information is important. The course will cover both the classical techniques and many of the new ones for which tables and procedures are now readily available. The purpose of this course is to show that quality control involves far more than scientific inspection and is a management tool of great value.

### Minimum Requirements

High school mathematics with a knowledge of elementary algebra and graphs and previous participation in a course in Quality Control or Applied Statistics.

### Course Chairman

Mr. A. G. Knowles,  
Quality Control Manager,  
Aircraft & Appliances Ltd.

**Time:** Tuesday 7.30 p.m.

Fall Term: October 13–December 15

Winter Term: January 5–March 9

**Place:** Room 404, Mechanical Building

**Fee:** \$40.00

### Registration

By mail or in person at Room 201, 84 Queen's Park, 9 a.m. to 5 p.m. daily, except Saturdays. Information may be obtained by telephoning 928-2393, 928-2394, 928-2395, or 928-2396.

## PROGRAMME

1. **Introduction to Quality Control**  
Historical background, work of Shewhart, Dodge and Romig. The problem, nature and definition of control. Chance and assignable causes. The role of statistical theory. Advantages secured through control. Detection of lack of control. Definition of Quality. Specifications for quality.
2. **Presentation of Data**  
The problem of presentation of data, grouped and ungrouped data, simple statistics, measurement of variation. The idea of sampling and probability. Inverse probability. The problem of collecting reliable data, errors of measurement. Nature of variation. The normal law of probability. Gaussian, binomial, poisson and hypergeometric distributions.
3. **Sampling by Variables—Graphical Methods**  
Probability paper, normal and log normal data. Transformed data.
- 4 and 5. **Control Charts—Variables**  
X & R charts, control limits, chart factors, trend charts, charts with modified limits, sensitivity of averages, assignable causes, definitions.
- 6 and 7. **Control Charts—Attributes**  
p, pn and c charts, control limits, limits with variable sample sizes, charts with two-way limits, table and charts for calculating limits, definitions.
8. **Sampling by Attributes—Introduction**  
Introduction to sampling, operating characteristics of sampling plans, consumers and producers risks, definitions and terminology, acceptance and rejection numbers.
- 9 and 10. **Sampling by Attributes—Sampling Plans**  
Attribute, plans, Single, Double, Multiple and Sequential plans. O C Curves, AQL, AOQL, ATI, etc.
- 11 and 12. **Sampling by Attributes—MIL-STD-105D**  
Available tables, advantages, levels of inspection, normal tightened and reduced sampling, practical application.
- 13 and 14. **Sampling by Variables**  
Jacobson's monogram, methods of determining sample size, consumers and producers risks, MIL-STD-414. Variables sampling applied to machine and process capability.